MOTIVATION

1) Capital income is about 25% of national income (labor income is 75%) but growing and distribution of capital income is much more unequal than labor income.

Capital income inequality is due to differences in savings behavior but also inheritances received.

⇒ Equity suggests it should be taxed more than labor.

2) Capital Accumulation correlated strongly with growth [although causality link is not obvious] and capital accumulation might be sensitive to the net-of-tax return.

⇒ Efficiency cost of capital taxation might be high.
Figure 12: Capital shares in factor-price national income
1975-2010

Source: Piketty and Zucman (2014)
MACRO FRAMEWORK

Constant return to scale aggregate production:

\[ Y = F(K, L) = rK + wL = \text{output} = \text{income} \]

\( K \) = capital stock (wealth), \( L \) = labor input

\( r \) = rate of return on capital, \( w \) is wage rate

\( rK \) = capital income, \( wL \) = labor income

\( \alpha = \frac{rK}{Y} \) = capital income share (constant \( \alpha \) when \( F(K, L) = K^\alpha L^{1-\alpha} \) Cobb-Douglas), \( \alpha \approx 30\% \)

\( \beta = \frac{K}{Y} \) = wealth to annual income ratio, \( \beta \approx 4 - 6 \)

\( r = (rK/Y) \cdot (Y/K) = \alpha/\beta, \ r = 5 - 6\% \)
FACTS ABOUT WEALTH

**Definition:** Capital Income = Income generated by wealth

Wealth arises from expected future income and value of assets

Private wealth includes real estate (land+buildings), corporate and business equity, fixed claimed assets (bonds+deposits), net of debts (mortgage, student loans, consumer credit)

Aggregate US **Private** Wealth $\simeq 6 \times$ Annual National Income (big increase in recent years)

Total wealth reflects both **capital stock accumulated through savings** and **pure price effects**

Example 1: house can increase in value because it is improved (capital) or because local prices go up (pure price effect)

Example 2: greater monopoly power makes a business more valuable to owners (but at the expense of consumers) with no change in operating capital

Recent increase in US private wealth mostly due to price effects
This figure depicts the share of total household wealth relative to national income. Source: Piketty, Saez, and Zucman (2018).
Figure 8  The rise of private versus the decline of public wealth in rich countries, 1970-2020

Interpretation: Public wealth is the sum of all financial and non-financial assets, net of debts, held by governments. Public wealth dropped from 60% of national income in 1970 to -106% in 2020 in the UK. Sources and series: wir2022.wid.world/methodology, Bauluz et al. (2021) and updates.
The changing nature of national wealth, UK 1700-2010

National wealth = agricultural land + housing + other domestic capital goods + net foreign assets

Source: Piketty, Handbook chapter, 2014
The changing nature of national wealth, US 1770-2010 (incl. slaves)

National wealth = agricultural land + housing + other domestic capital goods + net foreign assets

Source: Piketty and Zucman '13

Analyzes income, wealth, inheritance data over the long-run:

1) Growth rate $n + g = \text{population growth } + \text{growth per capita}$. Population growth will converge to zero, growth per capita for frontier economies is modest (1%) $\Rightarrow$ long-run $g \simeq 1\%, n \simeq 0\%$

2) Long-run steady-state Wealth to income ratio ($\beta$) = savings rate ($s$) / annual growth ($n + g$): $\beta = s/(n + g)$

Proof: $K_{t+1} = (1 + n + g) \cdot K_t = K_t + s \cdot Y_t \Rightarrow K_t/Y_t = s/(n + g)$

With $s = 8\%$ and $n + g = 2\%$, $\beta = 400\%$ but with $s = 8\%$ and $n + g = 1\%$, $\beta = 800\% \Rightarrow$ Wealth will become important

Debate on whether price effects vs. savings effects driving up wealth values (Rognlie 2015)
3) After-tax rate of return on wealth $\bar{r} = r(1 - \tau_K) = 4 - 5\%$

significantly larger than $n + g$ [except exceptional period of 1930–1970]

With $\bar{r} > n + g$, role of inheritance in wealth and wealth concentration become large [past swallows the future]

Explanation: Rentier who saves all his return on wealth accumulates wealth at rate $\bar{r}$ bigger than $n + g$ and hence his wealth grows relative to the size of the economy. The bigger $\bar{r} - (n + g)$, the easier it is for wealth to “snowball”

⇒ Capital taxation reduces $r$ to $\bar{r} = r \cdot (1 - \tau_K) \Rightarrow$ This can reduce wealth concentration
The rate of return to capital (after tax and capital losses) fell below the growth rate during the 20th century, and may again surpass it in the 21st century. Sources and series: see piketty.pse.ens.fr/capital21c

Source: Piketty (2014)
INDIVIDUAL WEALTH AND CAPITAL INCOME

Wealth = \( W \), Income Return = \( r \), Capital Income = \( rW \), Price appreciation \( q \), Pure capital gain \( qW \). Total return = \( r + q \)

\[
W_t = W_{t-1} + (r_t + q_t) \cdot W_{t-1} + E_t + I_t - C_t
\]

where \( W_t \) is wealth at age \( t \), \( C_t \) is consumption, \( E_t \) labor income earnings (net of taxes), \( r_t + q_t \) is the average (net) total rate of return on investments and \( I_t \) net inheritances (gifts received and bequests minus gifts given).

Replacing \( W_{t-1} \) and so on, we obtain the following expression (assuming initial wealth \( W_0 \) is zero):

\[
W_t = \sum_{k=1}^{t} (E_k - C_k + I_k) \cdot \prod_{j=k+1}^{t} (1 + r_j + q_j)
\]
**INDIVIDUAL WEALTH AND CAPITAL INCOME**

\[
W_t = \sum_{k=1}^{t} (E_k - C_k) \cdot \prod_{j=k+1}^{t} (1 + r_j + q_j) + \sum_{k=1}^{t} I_k \cdot \prod_{j=k+1}^{t} (1 + r_j + q_j)
\]

1st term is **life-cycle** wealth, 2nd term is **inherited** wealth

Differences in Wealth and Capital income due to:

1) Age

2) Past earnings and saving behavior \(E_t - C_t\) [life cycle wealth]

3) Net Inheritances received \(I_t\) [transfer wealth]

4) Rates of return on wealth: income \(r_t\) and price effects \(q_t\)

[details in Davies-Shorrocks '00, Handbook chapter]
Wealth Inequality (Saez and Zucman ’16)

Wealth inequality is very large (always much higher than income inequality). Worldwide income and wealth inequality statistics constructed in World Inequality Report ’22

In the US in 2021: Top 1% wealthiest households has 40% of total wealth, Next 9% get about 35%, next 40% get 25%, bottom 50% get about 0%

Wealth inequality decreases from 1929 to 1980: wealth democratization due to rise in homeownership and pensions

Wealth inequality increases sharply since 1980 fueled by increases in income inequality and savings inequality [bottom 90% saves zero in net since 1990]

US public underestimates extent of wealth inequality and thinks the ideal wealth distribution should be a lot more equal [Norton-Ariely ’11]
**Figure 1.1** Global income and wealth inequality, 2021

**Interpretation:** The global 50% captures 8% of total income measured at Purchasing Power Parity (PPP). The global bottom 50% owns 2% of wealth (at Purchasing Power Parity). The global top 10% owns 76% of total Household wealth and captures 52% of total income in 2021. Note that top wealth holders are not necessarily top income holders. Income is measured after the operation of pension and unemployment systems and before taxes and transfers. **Sources and series:** wir2022.wid.world/methodology
agreed that such redistribution should take the form of moving wealth from the top quintile to the bottom three quintiles. In short, although Americans tend to be relatively more favorable toward economic inequality than members of other countries (Osberg & Smeeding, 2006), Americans' consensus about the ideal distribution of wealth within the United States.

Fig. 2. The actual United States wealth distribution plotted against the estimated and ideal distributions across all respondents. Because of their small percentage share of total wealth, both the “4th 20%” value (0.2%) and the “Bottom 20%” value (0.1%) are not visible in the “Actual” distribution.
WEALTH MEASUREMENT

In the US, wealth distribution much less well measured than income distribution because no systematic administrative source (no wealth tax). 4 methods to estimate wealth distribution:

1) Surveys: US Survey of Consumer Finances (SCF)

Uses tax returns data frame to oversample top 1%

Problems: small sample size (3500), measurement error, only every 3 years, starts in 1989, most recent is 2019

Distributional Financial Accounts [web] combine SCF and macro financial accounts to distribute US wealth at quarterly level since 1989 up to present (see Saez and Zucman JEP’20)

Top 10% wealth share grew from 67% in 1989 to 77% in 2019

Top 1% wealth share grew from 28% in 1989 to 38% in 2019
2) **Estate multiplier method:** use annual estate tax statistics and re-weights individual estates by inverse of death probability [based on age \times gender \times social class]

Kopczuk-Saez NTJ’04 create series 1916-2000 and find fairly small increases in wealth concentration in recent decades

Problems: longevity of rich has increased faster than average, significant estate tax avoidance, estates cover only the super rich [see Saez and Zucman 2019b]

3) **Capitalization method:** use capital income from individuals tax statistics and estimates rates of returns by asset class to infer wealth: shows big increase in wealth concentration [Saez-Zucman ’16]. Real-time in Blanchet-Saez-Zucman ’22

4) **Rich lists:** Forbes and Bloomberg magazines compile lists of US billionaires using public records on publicly traded stock ownership, estimates of private businesses, and diversified portfolios. Used to improve estimates from 1) and 3).
Top 10% wealth share

Source: Saez and Zucman JEP'20

Distributional Financial Accounts

Saez and Zucman (2016) 2020 update
Top 1% wealth share

Saez-Zucman (2016)
2020 update
Distributional Financial Accounts
Wealth of the top 400 wealthiest Americans (top 0.00025%) (% of US GDP)

October 1st, 2021
Wealth During the Pandemic

After a very short dip in early 2020, wealth per adult (defined as the value of all assets owned minus debts) boomed during the pandemic. As shown in the graph below, this wealth growth was higher for the rich than for the middle class.

Interested in further investigating wealth during the pandemic? Click on this link to interact with a fully customizable version of this graph.
Figure 3.5. Wealth inequality in the U.S., 1810-2010

The top 10% wealth holders own about 80% of total wealth in 1929, and 75% today.
The top decile (the top 10% highest wealth holders) owns 80-90% of total wealth in 1810-1910, and 60-65% today.
The top decile owns 80-90% of total wealth in 1810-1910, and 70% today.
The top 10% holds 80-90% of total wealth in 1810-1910, and 55-60% today.
LIFE CYCLE VS. INHERITED WEALTH

Old view: Tobin and Modigliani: life cycle wealth accounts for the bulk of the wealth held in the US. Kotlikoff-Summers JPE’81 challenged the old view (debate Kotlikoff vs. Modigliani in JEP’88)

Why is this question important?

1) Economic Modeling: what accounts for wealth accumulation and inequality? Is widely used life-cycle model with no bequests a good approximation?

2) Policy Implications: taxation of capital income and estates. Role of pay-as-you-go vs. funded retirement programs

Key problem is that the definition of life-cycle vs. inherited wealth is not conceptually clean (Modigliani does not capitalize inherited wealth while Kotlikoff-Summers do)
LIFE CYCLE VS. INHERITED WEALTH

Piketty-Postel-Vinay-Rosenthal EEH’14 (PPVR) propose better definition to resolve Modigliani vs. Kotlikoff-Summers controversy (see Piketty-Zucman Handbook chapter ’14)

Individual wealth accumulation (using $R = r + q$ total return):

$$W_t = \sum_{k=1}^{t} (E_k - C_k) \cdot (1 + R)^{t-k} + \sum_{k=1}^{t} I_k \cdot (1 + R)^{t-k}$$

If $W_t > \sum_{k=1}^{t} I_k \cdot (1 + R)^{t-k}$ then individual also saves out of labor income $E_k$ and inherited wealth is $\sum_{k=1}^{t} I_k \cdot (1 + R)^{t-k}$

If $W_t \leq \sum_{k=1}^{t} I_k \cdot (1 + R)^{t-k}$ then individual has consumed part of inheritances (in addition to labor income) and inherited wealth is $W_t$

PPVR requires micro-data for implementation. If we assume uniform saving rate $s$, there is a simplified formula for share of inherited wealth $b_y/[b_y + (1 - \alpha) \cdot s]$ with $b_y$ bequest flow/national income and $\alpha$ capital share
How do the shares of inheritance vs. life-cycle evolve over time? First measure is inheritance flow to national income

Inheritance share likely huge in the distant past: class society with landowners vs. workers [Delong ’03]

Inheritance share ↓ in 20th century but has ↑ recently in France (Piketty QJE’11, Piketty-Zucman ’14 handbook chapter)

Post-war period was a time of fast population and economic growth ⇒ If \( n + g \) (growth) large relative to \( r \) (rate of return on wealth) ⇒ Inheritances play minor role in life-time wealth

In general \( r > n + g \) in which case inheritances play a large role in aggregate wealth and wealth concentration is going back (Western countries moving in that direction, Piketty ’14)
Figure I

Annual inheritance flow as a fraction of national income, France 1820-2008

- Economic flow (computed from national wealth estimates, mortality tables and observed age-wealth profiles)
- Fiscal flow (computed from observed bequest and gift tax data, inc. tax exempt assets)

Source: Piketty QJE'11

FIGURE I
inheritance share was rising fast in the late 19th and early 20th centuries. The shocks caused by the 1930s and the Second World War led to a downturn, but much less pronounced than in Europe, so the US inheritance share became higher than in Europe by the mid-20th century. In recent decades, the inheritance share seems to have increased substantially in the USA. However, there is significant uncertainty about the exact levels and trends, due in particular to the limitations of US estate tax data (which covers only a small fraction of all decedents, so it cannot be used to produce aggregate series).

We should also emphasize that there are significant variations within Europe. For simplicity, we define 'Europe' in Figure 1 as the average of France, Germany and the UK.² We will see later that France and Germany follow a particularly marked U-shaped pattern, while the UK pattern is in some ways closer to the US evolution.

In brief, our general conclusion is that there are substantial variations in the inheritance share over time and across countries, and that one should be careful not to interpret averages over one or two decades as steady-state outcomes. Wealth accumulation takes time: it spans over several generations, so it is important to take a very-long-run perspective on these issues. Modigliani's conclusions—

— with a large majority of wealth coming from lifecycle savings—

— might have been right for the immediate postwar period (though somewhat exaggerated). But the Kotlikoff–Summers estimates—

— with inheritance accounting for a significant majority of wealth—

appear to be closer to what we generally observe in the long run, in both the 19th and early 20th centuries, and in the late 20th and early 21st centuries.

Regarding the very long run, we stress that there are many different possible steady-state levels for the inheritance share. As we will see, there are several forces that tend to imply that low-growth societies also have higher inheritance shares. But other effects can go in the opposite direction. Depending on the evolution of demographic parameters, ³

² Source: Alveredo-Garbinti-Piketty '17

³
CAPITAL TAXATION IN THE US

Four main capital taxes in US (and most OECD countries):

1) **Corporate Income Tax** (fed+state): 21% Federal tax rate on profits of corporations [complex rules with many industry specific provisions]: effective tax rate much lower and incidence depends on mobility of capital bc tax is source based

2) **Individual Income Tax** (fed+state): taxes many forms of capital income. Tax is based on owners’ residence.

Realized capital gains and dividends receive preferential treatment (to alleviate double corporation+individual tax)

Imputed rent of homeowners, returns on pension funds, state+local government bonds interest are exempt
FACTS OF US CAPITAL INCOME TAXATION

3) Estate and gift taxes:
Fed taxes estates above $11M exemption (only .1% of deceased liable), tax rate is 40% above exemption (2013+)

Charitable and spousal giving are exempt

Substantial tax avoidance activity through tax accountants

Step-up of realized capital gains at death (lock-in effect)

4) Property taxes (local) on real estate (old tax):
Tax varies across jurisdictions. About 0.5% of market value on average, like a 10% tax on imputed rent if return is 5%

5) Progressive Wealth tax: debated in the US, exists in some countries
Average tax rates: labor vs. capital in the United States

Source: Saez and Zucman (2019)
TAXES IN OLG LIFE-CYCLE MODEL

Life-time utility: \( U = u(c_1, l_1) + \delta \cdot u(c_2, l_2) \)

No tax situation: earn \( w_1 l_1 \) in period 1, \( w_2 l_2 \) in period 2

Savings \( s = w_1 l_1 - c_1, c_2 = w_2 l_2 + (1 + r)s \)

Capital income \( r \cdot s \)

Intertemporal budget with no taxes:

\( c_1 + c_2/(1 + r) = w_1 l_1 + w_2 l_2/(1 + r) \)

This model has uniform rate of return and does not capture excess returns
TAXES IN OLG MODEL

Budget with consumption tax $t_c$:

$$(1 + t_c)[c_1 + c_2/(1 + r)] = w_1 l_1 + w_2 l_2/(1 + r)$$

Budget with labor income tax $\tau_L$:

$$c_1 + c_2/(1 + r) = (1 - \tau_L)[w_1 l_1 + w_2 l_2/(1 + r)]$$

Consumption and labor income tax are equivalent if

$$1 + t_c = 1/(1 - \tau_L)$$

Both taxes distort only labor-leisure choice

Timing of taxes paid differ: you pay when you earn with labor tax, you pay when you consume with consumption tax
TAXES IN OLG MODEL

Budget with capital income tax $\tau_K$:

$$c_1 + c_2/(1 + r(1 - \tau_K)) = w_1 l_1 + w_2 l_1/(1 + r(1 - \tau_K))$$

$\tau_K$ distorts only inter-temporal consumption choice

Budget with comprehensive income tax $\tau$:

$$c_1 + c_2/(1 + r(1 - \tau)) = (1 - \tau)[w_1 l_1 + w_2 l_2/(1 + r(1 - \tau))]$$

$\tau$ distorts both labor-leisure and inter-temporal consumption choices

$\tau$ imposes “double” tax: (1) on earnings, (2) on savings
EFFECT OF $r$ ON SAVINGS (skip)

Assume that labor supply is fixed. Draw graph. Suppose $r \uparrow$:

1) Substitution effect: price of $c_2 \downarrow \Rightarrow c_2 \uparrow$, $c_1 \downarrow \Rightarrow$ savings $s = w_1 l_1 - c_1 \uparrow$.

2) Wealth effect: Price of $c_2 \downarrow \Rightarrow$ both $c_1$ and $c_2 \uparrow \Rightarrow$ save less

3) Human wealth effect: present discounted value of labor income $\downarrow \Rightarrow$ both $c_1$ and $c_2 \downarrow \Rightarrow$ save more

Note: If $w_2 l_2 < c_2$ (ie $s > 0$), 2)+3) $\Rightarrow$ save less

Total net effect is theoretically ambiguous $\Rightarrow \tau_K$ has ambiguous effects on $s$
SHIFT FROM LABOR TO CONSUMPTION TAX

Labor and consumption are equivalent for the individual if $1 + t_c = 1/(1 - \tau_L)$ but savings pattern is different.

Assume $w_2 = 0$ and $l_1 = 1$

$$(1 + t_c)[c_1 + c_2/(1 + r)] = w_1$$ with consumption tax

$$c_1 + c_2/(1 + r) = (1 - t_L)w_1$$ with labor tax

1) Consumption tax $t_c$: $c^c_1 = (w_1 - s_c)/(1 + t_c), c^c_2 = (1 + r)s_c/(1 + t_c)$

2) Labor income tax $\tau_L$: $c^L_1 = w_1(1 - \tau_L) - s_L, c^L_2 = (1 + r)s_L$

Same consumption in both cases so $s_L = s_c/(1 + t_c) \Rightarrow$ Save more with a consumption tax
TRANSITION FROM LABOR TO C TAX (skip)

In OLG model and closed economy, capital stock is due to life-cycle savings \( s \)

Start with labor tax \( \tau_L \) and switch to a consumption tax \( t_c \)

The old [at time of transition] would have paid nothing in labor tax regime but now have to pay tax on \( c_2 \)

For the young [and future generations], the two regimes look equivalent so they now save more and increase the capital stock

However, this increase in capital stock comes at the price of hurting the old who are taxed twice
TRANSITION FROM LABOR TO C TAX (skip)

Suppose the government keeps the old as well off as in previous system by exempting them from consumption tax.

This creates a deficit in government budget equal to

\[ d = \tau_L w_1 - t_c c_1 = t_c w_1/(1 + t_c) - t_c c_1 = t_c s_L \]

Extra saving by the young is \( s_c - s_L = t_c s_L \) exactly equal to government deficit.

**Full neutrality result:** Extra savings of young is equal to old capital stock + new government deficit \( \Rightarrow \) no change in the aggregate capital stock.

Full neutrality depends crucially on same \( r \) for govt debt and aggregate \( r \) [in practice: equity premium puzzle]

[Same result for Social Security privatization]
OPTIMAL CAPITAL INCOME TAXATION

Complex problem with many sub-literatures: Banks and Diamond Mirrlees Review ’09, Stantcheva ’20 provide surveys.

1) Life-cycle models [linear and non-linear earnings tax]

2) Models with bequests [many models including the infinite horizon model]


Bigger gap between theory and policy practice than in the case of static labor income taxation
Life-Cycle model: Atkinson-Stiglitz JpubE ’76

Heterogeneous individuals and government uses nonlinear tax on earnings. Should the govt also use tax on savings?

\[ V^h = \max U^h(v(c_1, c_2), l) \text{ st } c_1 + c_2/(1+r(1-\tau_K)) = w_l - T_L(w_l) \]

If utility is weakly separable and \( v(c_1, c_2) \) is the same for all individuals, then the government should use only labor income tax and should not use tax on savings.

Recent proof by Laroque EJ ’05 or Kaplow JpubE ’06.

Tax on savings justified if:

(1) High skill people have higher taste for saving (e.g, high skill people have lower discount rate) [Saez, JpubE ’02]

(2) \( c_2 \) is complementary with leisure
Life-cycle model: linear labor income tax

Suppose the government can only use linear earnings tax: $wl \cdot (1 - \tau_L) + E$ instead of nonlinear tax $wl - T(wl)$

If sub-utility $v(c_1, c_2)$ is also homothetic of degree one [i.e., $v(\lambda c_1, \lambda c_2) = \lambda v(c_1, c_2)$ for all $\lambda$] then $\tau_K = 0$ is again optimal [linear tax counter-part of Atkinson-Stiglitz, see Deaton, 1979]

In the general case $V^h(c_1, c_2, l)$, optimal $\tau_K$ is not always zero

Old literature considered the Ramsey one-person model of linear taxation and expressed optimal $\tau_K$ as a function of compensated price and cross-price elasticities [Corlett-Hague REstud'54, King, 1980, and Atkinson-Sandmo EJ'80]
LIMITS OF LIFE-CYCLE MODEL

Atkinson-Stiglitz shows that life-time savings should not be taxed, tax only labor income

From justice view: seems fair to not discriminate against savers if labor earnings is the only source of inequality and is taxed non-linearly

In reality, capital income inequality also due

(1) difference in rates of returns

(2) shifting of labor income into capital income

(3) inheritances

(1) is not relevant if individuals handle risky assets rationally (as in CAPM model), probably not a very good assumption ⇒ Tax on lucky returns might be desirable
SHIFTING OF LABOR / CAPITAL INCOME

In practice, difficult to distinguish between capital and labor income [e.g., small business profits, professional traders]

Differential tax treatment can induce shifting:

(1) US C-corporations vs S-corporations: shift from corporate income (and subsequent realized capital gains) toward individual business income [Gordon and Slemrod ’00]

(2) Carried interest in the US: hedge fund and private equity fund managers receive fraction of profits of assets they manage for clients. Those profits are really labor income but are taxed as realized capital gains

(3) Finnish Dual income tax system: taxes separately capital income at preferred rates since 1993: Pirttila and Selin SJE’11 show that it induced shifting from labor to capital income especially among self-employed
Theory: Shifting of Labor / Capital Income

Extreme case where government cannot distinguish at all between labor and capital income ⇒ Govt observes only \( wl + rK \)

⇒ Only option is to have identical MTRs at individual level ⇒ General income tax \( Tax = T(wl + rK) \)

With a finite shifting elasticity, differential MTRs for labor and capital income taxation induce an additional shifting distortion

The higher the shifting elasticity, the closer the tax rates on labor and capital income should be [Christiansen and Tuomala ITAX’08, see also Piketty-Saez Handbook chapter ’13]

In practice, this seems to be a very important consideration when designing income tax systems [especially for top incomes] ⇒ Strong reason for having \( \tau_L = \tau_K \) at the top
Taxation of Inheritances: Welfare Effects

Definitions: donor is the person giving, donee is the person receiving

Inheritances and inter-vivos transfers raise difficult issues:

(1) Inequality in inheritances contributes to economic inequality: seems fair to redistribute from those who received inheritances to those who did not

(2) However, it seems unfair to double tax the donors who worked hard to pass on wealth to children

⇒ Double welfare effect: inheritance tax hurts donor (if donor altruistic) and donee (which receives less) [Kaplow, ’01]
Estate Taxation in the United States

Estate federal tax imposes a tax on estates above $11M exemption (only about .1% of deceased liable), tax rate is 40% above exemption (2013+)

Charitable and spousal giving are fully exempt from the tax

E.g.: if Bill Gates / Warren Buffet give all their wealth to charity, they won’t pay estate tax

Support for estate tax is pretty weak (“death tax”) but public does not know that estate tax affects only richest

Support for estate tax increase shots up from 17% to 53% when survey respondents are informed that only richest pay it (Kuziemko-Norton-Saez-Stantcheva ’13 do an online Mturk survey experiment)
Besides the income tax, the government can also level the playing field with the federal estate tax.

The Federal Estate Tax (also known as the Death Tax) applies when a deceased person leaves more than $5 million in wealth to his or her heirs. Wealth left to a spouse or charitable organizations is exempt from estate tax.

Only 1 person out of 1000 is wealthy enough to face the estate tax.

Average Americans do not have anything close to $5 million in wealth, so the estate tax does not affect them and they can pass on their property to their children tax-free.

Eliminating the estate tax would allow the very richest families to pass down all of their wealth to their children tax-free. Hence, children of rich people would also start off very rich themselves.

Increasing the estate tax is a way to level the playing field between the children of wealthy parents and children of middle-class parents.
Taxation of Inheritances: Behavioral Responses

Potential behavioral response effects of inheritance tax:

(1) reduces wealth accumulation of altruistic donors (and hence tax base) [modest effects: best evidence is Goupille-Infante ’18 using french reform on tax treatment of savings]

(2) reduces labor supply of altruistic donors (less motivated to work if cannot pass wealth to kids) [no good evidence]

(3) induces donees to work more through income effects (Carnegie effect, decent evidence from Holtz-Eakin, Joulfaian, Rosen QJE’93)

Critical to understand why there are inheritances to decide on optimal inheritance tax policy. 4 main models of bequests: (a) accidental, (b) bequests in the utility, (c) manipulative bequest motive, (d) dynastic
Inheritance tax and wealth accumulation

France has a tax preferred savings vehicle (like US IRA) with unlimited contributions “Assurance vie” with reform in 1992:

Control: Accounts opened before 11/1991: only 20% tax when bequeathed

Treatment: Accounts opened after 11/1991: contributions at age 70+ face higher 40% inheritance tax when bequeathed

Goupille-Infante JpubE’18 uses AXA bank data for 2003-13:

Short-term retiming: spike in contributions at age 70

Long-run real+shifting response: small DD in balances at age 70+ with elasticity wrt \(1−\tau\) of .4 (combines real+shifting responses so real response even smaller)

⇒ Even wealthy individuals respond myopically (treatment should contribute heavily before 70)
Finally, we can obtain reduced-form timing responses by fitting the following regression model:

\[
\begin{align*}
\text{Empirical contributions by age} & \quad \text{Contrefactual contributions by age} \\
\end{align*}
\]

\[
\begin{align*}
b & = 0.827 (0.066) \\
\end{align*}
\]

Bunching at age 70 after which contributions will be taxed more upon bequest.

Fig. 4. Impact of inheritance tax on wealth accumulation: Difference-in-differences evidence. Notes: The figure shows the normalized average log of (contributions + 1) and the normalized average log of (account balances + 1) by quarterly age in the control and treatment group. The normalization consists in subtracting to each aver-
ACCIDENTAL BEQUESTS

Bequest taxation has no distortionary effect on behavior of donor and can only increase labor supply of donees (through income effects)

⇒ strong case for taxing bequests heavily

Wealth loving: Same tax policy conclusion arises if donors have wealth in their utility function [social status or power, Carroll '98]

Kopczuk-Lupton REStud’07 shows that only 1/3 of people accumulate wealth for bequest motives
Bequests in the Utility: Warm Glow Or Altruistic

\[ u(c) - h(l) + \delta \cdot v(b) \] where \( c \) is own consumption, \( l \) is labor supply, and \( b \) is net-of-tax bequests left to next generation and \( v(b) \) is warm glow utility of bequests

Budget with no estate tax:
\[ c + \frac{b}{1 + r} = wl - T_L(wl) \]

Budget with bequest tax at rate \( \tau_B \):
\[ c + \frac{b}{[(1 + r)(1 - \tau_B)]} = wl - T_L(wl) \]

Suppose first that \( b \) is not bequeathed but used for “after-life” consumption [e.g., funerary monument of no value to next generation]

\( \Rightarrow \) Atkinson-Stiglitz implies that \( b \) should not be taxed \([\tau_B = 0]\) and that nonlinear tax on \( wl \) is enough for redistribution
Suppose now that $b$ is given to a heir who derives utility $v^{\text{heir}}(b)$ ⇒ $b$ creates a positive externality (to donee) and hence should be subsidized ⇒ $\tau_B < 0$ is optimal

Kaplow ’01 makes this point informally

Farhi-Werning QJE’10 develop formal model of non-linear Pigou-vian subsidization of bequests with 2 generations and social Welfare:

$$SWF = \int [u(c) - h(l) + \delta v(b) + v^{\text{heir}}(b)] f(w) dw$$

The marginal external effect of bequests is $dv^{\text{heir}}/db$ and hence should be smaller for large $b$

⇒ Optimal subsidy rate is smaller for large estates ⇒ progressive estate subsidy
A-S Fails with Inheritances In General Equilibrium
(Piketty-Saez ECMA’13)

Atkinson-Stiglitz applies when sole source of lifetime income is labor:

\[ c + b(\text{left})/(1+r) = wl - T(wl) \quad (w = \text{productivity, } l = \text{labor supply}) \]

In GE, bequests provide an additional source of life-income:

\[ c + b(\text{left})/(1+r) = wl - T(wl) + b(\text{received}) \]

⇒ conditional on \( wl \), high \( b(\text{left}) \) is a signal of high \( b(\text{received}) \)
⇒ \( b(\text{left}) \) should be taxed even with optimal \( T(wl) \)

⇒ Two-dim. inequality requires two-dim. tax policy tool

**Extreme example:** no heterogeneity in productivity \( w \) but pure heterogeneity in bequests motives ⇒ bequest taxation is desirable for redistribution
Piketty-Saez Simplified Optimal Inheritance Tax Model

Measure one of individuals, who are both bequests receivers and bequest leavers (in ergodic general equilibrium)

Linear tax $\tau_B$ on bequests funds lumsum grant $E$

Life-time budget constraint: $c_i + b_i = R(1 - \tau_B)b_i^r + yLi + E$

with $c_i$ consumption, $b_i$ bequests left, $yLi$ inelastic labor income, $b_i^r$ pre-tax bequests received, $R = 1 + r$ generational rate of return on bequests

Individual $i$ has utility $V^i(c, b)$ with $b = R(1 - \tau_B)b$ net-of-tax bequests left and solves

$$\max_{b_i} V^i(yLi + E + R(1 - \tau_B)b_i^r - b_i, Rb_i(1 - \tau_B)) \Rightarrow V^i_c = R(1 - \tau_B)V^i_b$$
Piketty-Saez ECMA’13 Optimal Inheritance Tax

Government budget constraint is \( E = \tau_B b \) with \( b \) aggregate (average) bequests. Govt solves:

\[
\max_{\tau_B} \int \omega_i V^i (y_{Li} + \tau_B b + R(1 - \tau_B)b_i^r - b_i, Rb_i(1 - \tau_B))
\]

with \( \omega_i \geq 0 \) Pareto weights

Meritocratic Rawlsian criterion: maximize welfare of those receiving no inheritances with uniform social marginal welfare weight \( \omega_i V^i_c \) among zero-receivers

(e.g., people not responsible for \( b_i^r \) but responsible for \( y_{Li} \)) \( \Rightarrow \)

**Optimal inheritance tax rate:** \( \tau_B = \frac{1 - \bar{b}}{1 + e_B} \)

with \( e_B = \frac{1 - \tau_B}{b} \frac{db}{d(1 - \tau_B)} \) elasticity of aggregate bequests and

\( \bar{b} = \frac{E[b_i|b_i^r=0]}{b} \) relative bequest left by zero-receivers
Piketty-Saez ECMA’13 Optimal Inheritance Tax: Proof

\[ SWF = \int \omega_i V^i(y_{Li} + \tau_B b_i - b_i, Rb_i(1 - \tau_B)) \]

[NB: removed term \( R(1 - \tau_B)b_i^r \) because \( \omega_i = 0 \) when \( b_i^r = 0 \)]

\[
0 = \frac{dSWF}{d\tau_B} = \int \omega_i \cdot \left( V^i_c \left[ b - \tau_B \frac{db}{d(1 - \tau_B)} \right] - Rb_i V^i_b \right) \Rightarrow
\]

\[
0 = \int \omega_i \cdot \left( V^i_c \cdot b \left[ 1 - \tau_B \frac{e_B}{1 - \tau_B} \right] - \frac{b_i}{1 - \tau_B} V^i_c \right) \Rightarrow
\]

\[
0 = b \left[ 1 - \tau_B \frac{e_B}{1 - \tau_B} \right] - \frac{1}{1 - \tau_B} \cdot \frac{\int \omega_i V^i_c \cdot b_i}{\int \omega_i V^i_c} \Rightarrow
\]

as \( \omega_i V^i_c \equiv 0 \) for \( b_i^r > 0 \) and \( \omega_i V^i_c \equiv 1 \) for \( b_i^r = 0 \) \Rightarrow

\[
0 = 1 - \tau_B - \tau_B \cdot e_B - \frac{E[b_i | b_i^r = 0]}{b} \Rightarrow \tau_B = \frac{1 - \bar{b}}{1 + e_B}
\]
Optimal inheritance tax rate: \( \tau_B = \frac{1 - \bar{b}}{1 + e_B} \)

1) Optimal \( \tau_B < 1/(1 + e_B) \) revenue maximizing rate because zero-receivers care about bequests they leave

2) \( \tau_B = 0 \) if \( \bar{b} = 1 \) (i.e, zero-receivers leave as much bequest as average)

3) If bequests are quantitatively important, highly concentrated, and low wealth mobility then \( \bar{b} << 1 \)

4) Empirically \( e_B \) small (Kopczuk-Slemrod '01) but poorly known, \( \bar{b} = 2/3 \) in US (SCF data) but poorly measured

5) Formula can be extended to other social criteria, elastic labor supply, wealth loving preferences, altruistic preferences [see Piketty-Saez ECMA’13]
MANIPULATIVE BEQUESTS

Parents use potential bequest to extract favors from children

Empirical Evidence: Bernheim-Shleifer-Summers JPE ’85 show that number of visits of children to parents is correlated with bequeathable wealth but not annuitized wealth of parents

⇒ Bequest becomes one additional form of labor income for donee and one consumption good for donor

⇒ Inheritances should be counted and taxed as labor income for donees
SOCIAL-FAMILY PRESSURE BEQUESTS

Parents may not want to leave bequests but feel compelled to by pressure of heirs or society: bargaining between parents and children

With estate tax, parents do not feel like they need to give as much ⇒ parents are made better-off by the estate tax ⇒ Case for estate taxation stronger [Atkinson-Stiglitz does not apply and no double counting of bequests]

Empirical evidence:

Aura JpubE’05: reform of private pension annuities in the US in 1984 requiring both spouses signatures when retiring worker decides to get a single annuity or couple annuity: reform ↑ sharply couple annuities choice

Equal division of estates [Wilhelm AER’96, Light-McGarry ’04]: estates are very often divided equally but gifts are not
DYNASTIC MODEL OR INFINITE HORIZON

Special case of warm glow: \( V_t = u(c_t, l_t) + \frac{V_{t+1}}{1 + \delta} \) implies
\[
V_0 = \sum_{t \geq 0} \frac{u(c_t, l_t)}{(1 + \delta)^t}
\]
subject to \( \sum_{t \geq 0} \frac{c_t}{(1 + r)^t} \leq \sum_{t \geq 0} \frac{w_t l_t}{(1 + r)^t} \)

Dynasty with **Ricardian equivalence**: consumption depends only on PDV of earnings of dynasty

Poor empirical fit:

1) Altonji-Hayashi-Kotlikoff AER’92, JPE’97 show that income shocks to parents have bigger effect on parents consumption than on kids consumption (and conversely)

2) Temporary tax cut debt financed [fiscal stimulus] should have no impact on consumption but actually do
INFINITE HORIZON MODEL: CHAMLEY-JUDD

Govt can collect taxes using linear labor income tax or capital income taxes that vary period by period $\tau^t_L, \tau^t_K$

Goal of the government is to maximize utility of the dynasty

$$V_0 = \sum_t u(c_t, l_t) / (1 + \delta)^t \text{ st } \sum_t q_t c_t \leq \sum_t q_t w_t (1 - \tau^t_L) l_t + A_0 \quad (\lambda)$$

$q_0 = 1, \ldots, q_t = 1 / \prod_{s=1}^{t} (1 + r_s (1 - \tau^s_K)), \ldots$

With constant tax rate $\tau_K$ and constant $r$: Before tax price: $p_t = 1 / (1 + r)^t$ and after-tax price $q_t = 1 / (1 + r (1 - \tau_K))^t \Rightarrow$

Price distortion $q_t / p_t$ grows exponentially with time
Chamley-Judd show that the capital income tax rate always tends to zero asymptotically: no capital tax in the long-run:

Two equivalent ways to understand this result:

(1) A constant tax on capital income creates an exponentially growing distortion which is inefficient

(2) The PDV of the capital income tax base is infinitely elastic with respect to an increase in $\tau_K$ in the distant future [Piketty-Saez '13]

Intuition: $u_c(c_{t+1})/u_c(c_t) = (1 + \delta)/(1 + r(1 - \tau_K)) \Rightarrow$ savings decisions infinitely elastic to $r(1 - \tau_K) - \delta$

If $r(1 - \tau_K) > \delta$, accumulate forever. If $r(1 - \tau_K) < \delta$, get in debt as much as possible.
ISSUES IN INFINITE HORIZON MODEL

1) Taxing initial wealth is most efficient [as this is lumpsum taxation] ⇒ solutions typically bang-bang: tax capital as much as possible early, then zero

2) Chamley-Judd tax is not time consistent: the government would like to renege and start taxing capital again

3) Zero-long run tax result is not robust to using progressive income taxation [Piketty, ’01, Saez JpubE’13]

4) Dynastic model requires strong homogeneity assumptions (in discount rates) to generate reasonable steady states [unlikely to hold in practice]

5) Introducing stochastic shocks in labor/preferences [Piketty-Saez ECMA’13] or wealth in the utility function [Saez-Stantcheva ’18] in dynamic model leads to finite elasticities (and reasonable optimal tax rates)
US WEALTH TAX DEBATE

Recent proposals for progressive wealth tax (Warren, Sanders, CA). Various justifications from center left to radical left:

(1) **Revenue:** US wealth is top heavy ⇒ well enforced wealth tax can raise substantial revenue

(2) **Tax fairness:** super-rich do not need to “realize” income and hence pay fairly low taxes relative to their true incomes (Saez-Zucman ’19, Propublica leak)

(3) **Oligarchy risk:** wealth at the top is power. Evidence from Robber Barons US 19th century and devo countries that entrenched wealth stifles growth (Acemoglu-Robinson ’12)

**Concerns of opponents:** Wealth tax will be easy to avoid/evade. If not, wealth tax will discourage entrepreneurs.
US WEALTH TAX DEBATE

Politically: wealth tax is easy for public to understand as a tax on the rich (and polls well even among republicans)

Economically: wealth tax powerful because

(1) wealth tax goes after the stock while a capital income tax goes after the flow: example if rate of return is \( r = 5\% \), a wealth tax at rate 5\% is like taxing capital income at 100\%.

(2) Capital income tax discourages high returns but wealth tax doesn’t (Allais 1966, Guvenen et al. 2019)

(3) wealth tax builds overtime: for billionaires, wealth tax mechanically reduces wealth by \( (1 - \tau_W) \) after 1 year, \( (1 - \tau_W)^2 \) after 2 years, ..., \( (1 - \tau_W)^t \) after t years, etc.

⇒ Billionaires can still arise but don’t stay billionaires as long
Average tax rates by income group in 2018
(% of pre-tax income)

Source: Saez and Zucman 2019
Adding old Warren wealth tax (2% above $50m, 3% above $1b) with 15% avoidance/evasion rate (Saez-Zucman)

Source: Saez and Zucman BPEA2019
## Long-Term Wealth Taxation and Top Wealth Holders

<table>
<thead>
<tr>
<th>Top Wealth Holder</th>
<th>Source</th>
<th>Current 2018 wealth ($ billions)</th>
<th>With Warren wealth tax (3% above $1b) since 1982</th>
<th>With Sanders wealth tax (5% above $1b up to 8% above $10b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jeff Bezos</td>
<td>Amazon (founder)</td>
<td>160.0</td>
<td>86.8</td>
<td>43.0</td>
</tr>
<tr>
<td>Bill Gates</td>
<td>Microsoft (founder)</td>
<td>97.0</td>
<td>36.4</td>
<td>9.9</td>
</tr>
<tr>
<td>Warren Buffett</td>
<td>Berkshire Hathaway</td>
<td>88.3</td>
<td>29.6</td>
<td>8.2</td>
</tr>
<tr>
<td>Mark Zuckerberg</td>
<td>Facebook (founder)</td>
<td>61.0</td>
<td>44.2</td>
<td>28.6</td>
</tr>
<tr>
<td>Larry Ellison</td>
<td>Oracle (founder)</td>
<td>58.4</td>
<td>23.5</td>
<td>8.5</td>
</tr>
<tr>
<td>Larry Page</td>
<td>Google (founder)</td>
<td>53.8</td>
<td>35.3</td>
<td>19.5</td>
</tr>
<tr>
<td>David Koch</td>
<td>Koch industries</td>
<td>53.5</td>
<td>18.9</td>
<td>8.0</td>
</tr>
<tr>
<td>Charles Koch</td>
<td>Koch industries</td>
<td>53.5</td>
<td>18.9</td>
<td>8.0</td>
</tr>
<tr>
<td>Sergey Brin</td>
<td>Google (founder)</td>
<td>52.4</td>
<td>34.4</td>
<td>19.0</td>
</tr>
<tr>
<td>M. Bloomberg</td>
<td>Bloomberg LP (f.)</td>
<td>51.8</td>
<td>24.2</td>
<td>11.3</td>
</tr>
<tr>
<td>Jim Walton</td>
<td>Walmart (heir)</td>
<td>45.2</td>
<td>15.1</td>
<td>5.0</td>
</tr>
<tr>
<td><strong>Total top 15</strong></td>
<td></td>
<td><strong>942.5</strong></td>
<td><strong>433.9</strong></td>
<td><strong>195.7</strong></td>
</tr>
</tbody>
</table>

Source: Saez and Zucman BPEA2019
Forbes 400 wealth share (% of US wealth)

- Actual share of wealth owned by the Forbes 400
- With Warren wealth tax (3% rate above $1bn)
- With Sanders wealth tax (5% above $1bn graduated to 8% above $10bn)

Source: Saez and Zucman BPEA2019
COULD A WEALTH TAX BE ENFORCED?

Wealth taxes have been used in Europe but most repealed (and never raised much revenue, except Switzerland). Suffered from 2 issues:

1) Tax competition concerns through offshore tax evasion and mobility of the rich: could evade easily or move out to avoid

2) Exemption threshold too low (like $1m) creating hardship for illiquid millionaires (led to inefficient illiquid asset exemptions such exempting stock of owner-managers or tax limits based on reported income)

Both weaknesses could be remedied:

1) Fight offshore tax evasion (FATCA) and tax expatriates

2) Set high exemption threshold ($50m rather than $1m)
Adding old Warren wealth tax (2% above $50m, 3% above $1b) with 15% avoidance/evasion rate (Saez-Zucman)

Source: Saez and Zucman BPEA2019
Adding old Warren wealth tax (2% above $50m, 3% above $1b) with 89% avoidance/evasion rate (Summers-Sarin)
Dynamic taxation in the presence of future earnings uncertainty

Recent series of papers following upon on Golosov, Kocherlakota, Tsyvinski REStud ’03 (GKT)

Principle can be understood in 2 period model: Diamond-Mirrlees JpubE ’78 and Cremer-Gahvari EJ ’95

Generalized to many periods by GKT and subsequent papers

Simple exposition is Kocherlakota AER-PP ’04

Two comprehensive surveys: Golosov-Tsyvinski-Werning ’06 and Kocherlakota ’10 book
NEW DYNAMIC PUBLIC FINANCE (NDPF)

Key ingredient is uncertainty in future ability $w$

2 period simple model:

(0) Everybody is identical in period 0: no work and consume $c_0$, period 0 utility is $u(c_0)$

(1) Ability $w$ revealed in period 1, work $l$ and earn $z = wl$, consume $c_1$, period 1 utility $u(c_1) - h(l)$

Total utility $u(c_0) + \beta[u(c_1) - h(l)]$

Rate of return $r$, gross return $R = 1 + r$

Discount rate $\beta < 1$
STANDARD EULER EQUATION

No govt intervention: \( c_0 + c_1/R = wl/R \)

Solve model backward (assume \( c_0 \) given):

Period 1: \( c_1 = wl - Rc_0 \), choose \( l \) to maximize \( u(wl - Rc_0) - h(l) \)

\[ \Rightarrow \text{FOC} \quad uw'(wl - Rc_0) = h'(l) \Rightarrow l^* = l(w, c_0) \]

Period 0: Choose \( c_0 \) to maximize:

\[ u(c_0) + \beta \int [u(wl^* - Rc_0) - h(l^*)]f(w)dw \]

FOC for \( c_0 \) (using envelope condition for \( l^* \))

\[ u'(c_0) = \beta R \int u'(c_1)f(w)dw \]

This is called the **Euler equation**
MECHANISM DESIGN

Government would like to redistribute from high $w$ to low $w$. Government does not observe $w$ but can observe $c_0, c_1, z = wl$ and can set taxes as a function of $c_0, c_1, z$

Equivalently (using revelation principle), govt can offer menu $(c_0, c_1(w), z(w))_w$ and let individuals truthfully reveal their $w$

Govt program: choose menu $(c_0, c_1(w), z(w))_w$ to maximize:

$$SW = u(c_0) + \beta \int [u(c_1(w)) - h(z(w)/w)] f(w) dw \text{ st}$$

1) Budget: $c_0 + \int c_1(w)f(w)dw/R \leq \int z(w)f(w)dw/R$

2) Incentive Compatibility (IC): individual $w$ prefers $c_0, c_1(w), z(w)$ to any other $c_0, c_1(w'), z(w')$
**INVERSE EULER EQUATION**

**Inverse Euler equation** holds at the govt optimum:

\[
\frac{1}{u'(c_0)} = \frac{1}{\beta R} \cdot \int \frac{1}{u'(c_1(w))} f(w)dw
\]

**Proof:** small deviation in menus offered: \( \Delta c_0 = -\varepsilon/u'(c_0) \) and \( \Delta c_1(w) = \varepsilon/[\beta u'(c_1(w))] \) with small \( \varepsilon > 0 \)

Does not affect individual utilities in any state:

\[
u(c_0 + \Delta c_0) + \beta u(c_1(w) + \Delta c_1(w)) = u(c_0) + \beta u(c_1(w))
\]

\[
+ \Delta c_0 u'(c_0) + \Delta c_1(w)\beta u'(c_1(w)) = u(c_0) + \beta u(c_1(w))
\]

\( \Rightarrow \) (IC) continues to hold and \( SW \) unchanged

Deviation must be budget neutral at optimum

\[
\Rightarrow -\frac{\varepsilon}{u'(c_0)} + \frac{1}{R} \int \frac{\varepsilon f(w)dw}{\beta u'(c_1(w))} = 0
\]
INTERTEMPORAL WEDGE

Jensen Inequality: for $K(.)$ convex

$$\Rightarrow K \left( \int x(w) dF(w) \right) < \int K(x(w)) dF(w)$$

Apply this to $K(x) = 1/x$ and $x(w) = u'(c_1(w)) \Rightarrow$

$$\frac{1}{\int u'(c_1(w)) f(w) dw} < \int \frac{f(w) dw}{u'(c_1(w))} = \frac{\beta R}{u'(c_0)}$$

$$\Rightarrow u'(c_0) < \beta R \int u'(c_1(w)) f(w) dw$$

$\Rightarrow$ Optimal govt redistribution imposes a positive tax wedge on intertemporal choice
NDPF DECENTRALIZATION AND INTUITION

Decentralization: Optimum can be decentralized with a tax on capital income [which depends on current labor income] along with a nonlinear tax on wage income [Kocherlakota EMA’06]

Economic intuition: If high skill person works less (to imitate lower skill person), person would also like to reduce $c_0$ and hence save more, so tax on savings is a good way to discourage imitation

Result depends crucially on rationality in inter-temporal choices + income effects on labor: not clear yet how applicable this is in practice

Would be valuable to explore empirically for example whether DI (disability insurance) cheaters were saving more than non cheaters [would require merging SSA data and tax/wealth data, hard to do]
NDPF NUMERICAL SIMULATIONS

Farhi-Werning '11 propose numerical calibration and show that, for realistic parameters, the welfare gain of using full nonlinear optimal capital/labor taxation is very small (0.1% in aggregate welfare) relative to using only optimal labor taxation.

Golosov-Troshkin-Tsyvinski '11 also find on average small welfare gains and small optimal capital tax rates.

⇒ Suggests that the mechanism is not quantitatively important even assuming the theory is right.

⇒ Policy relevance of the NDPF for capital taxation likely to be limited.

DI/retirement application of NDPF might be quantitatively more important.
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